CLAIMS

What is claimed is:

1. A power transmission fluid having improved friction properties, comprising:

(a) a major amount of a base oil; and

(b) a minor amount of at least one alkoxylated alcohol.

2. The fluid of claim 1, wherein the alkoxylated alcohol comprises the formula:

$R—[O—(CH_2)_X]_Y—OH$

wherein R is an aliphatic hydrocarbon group having from about 1 to about 50 carbon atoms, X is from about 1 to about 10, and Y is from about 1 to about 10.

3. The fluid of claim 2, wherein R is a hydrocarbon group having from about 8 to about 18 carbon atoms, X is from about 2 to about 4, and Y is from about 1 to about 6.

4. The fluid of claim 2, wherein the aliphatic hydrocarbon is a linear, branched, or cyclic hydrocarbon and is a saturated or unsaturated hydrocarbon.

5. The fluid of claim 1, wherein the amount of alkoxylated alcohol in the fluid is from about 0.01 wt% to about 20 wt%.

6. The fluid of claim 1, wherein the amount of alkoxylated alcohol in the fluid is from about 0.05 wt% to about 6 wt%.

7. The fluid of claim 1, wherein the fluid is suitable for use in a transmission employing one or more of a slipping torque converter, a lock-up torque converter, a starting clutch, and one or more shifting clutches.

8. The fluid of claim 1, wherein the fluid is suitable for use in a belt, chain, or disk-type continuously variable transmission (CVT).

9. The fluid of claim 1, further comprising a dispersant, wherein the dispersant comprises one or more of a hydrocarbyl succinimide, a hydrocarbyl succinamide, a mixture of an ester and an amide of a hydrocarbyl-substituted succinic acid, a hydroxyester of a hydrocarbyl-substituted succinic acid, and a Mannich condensation product of a hydrocarbyl-substituted phenol, a formaldehyde, and an amine.

10. The fluid of claim 9, wherein the concentration of the dispersant in the fluid is from about 0.01 wt% to about 15 wt%.

11. The fluid of claim 1, wherein the improved friction properties comprise improved friction durability and/or improved resistance to oxidative and thermal degradation relative to a fluid free of an alkoxylated alcohol.

12. A power transmission fluid comprising an alkoxylated alcohol having at least eight carbon atoms and a dispersant.

13. A method of making a power transmission fluid having friction modifying capabilities, comprising adding to a major amount of a base oil a minor amount of at least one alkoxylated alcohol.

14. The method of claim 13, wherein the alkoxylated alcohol is represented by the formula:

$$R—[O—(CH_2)_X]_Y—OH$$

where R is an aliphatic hydrocarbon group having from about 1 to about 50 carbon atoms, X is from about 1 to about 10, and Y is from about 1 to about 10.

15. The method of claim 14, wherein R is a hydrocarbon group having from about 8 to about 18 carbon atoms, X is from about 2 to about 4, and Y is from about 1 to about 6.

16. The method of claim 13, wherein the amount of alkoxylated alcohol in the fluid is from about 0.01 wt% to about 10 wt%.

17. The method of claim 16, wherein the amount of alkoxylated alcohol in the fluid is from about 0.1 wt% to about 3 wt%.

18. The method of claim 13, wherein the base oil comprises one or more of a natural lubricating oil, a synthetic lubricating oil, and mixtures thereof.

19. The method of claim 13, further comprising adding at least one ashless dispersant.

20. A method of making a power transmission fluid concentrate having improved friction modifying properties, comprising:

combining at least one alkoxylated alcohol and a dispersant; and

heating the alkoxylated alcohol and dispersant at a temperature between about 25°C and about 200°C for a time from about 0.1 to about 196 hours.

21. The method of claim 20, wherein the alkoxylated alcohol is represented by the formula:

$$R—[O—(CH_2)_X]_Y—OH$$

where R is an aliphatic hydrocarbon group having from about 1 to about 50 carbon atoms, X is from about 1 to about 10, and Y is from about 1 to about 10.

22. The method of claim 21, wherein R is a hydrocarbon group having from about 8 to about 18 carbon atoms, X is from about 2 to about 4, and Y is from about 1 to about 6.

23. The method of claim 20, further comprising adding a minor amount of the power transmission concentrate to a major amount of a base oil, thereby forming a power transmission fluid.

24. The method of claim 20, wherein the dispersant comprises one or more of a hydrocarbyl succinimide, a hydrocarbyl succinamide, a mixture of an ester and an amide of a hydrocarbyl-substituted succinic acid, a hydroxyester of a hydrocarbyl-substituted succinic acid, and a Mannich condensation product of a hydrocarbyl-substituted phenol, a formaldehyde, and an amine.

25. The method of claim 23, wherein the amount of the mixture of alkoxylated alcohol and dispersant in the power transmission fluid is from about 0.01 wt% to about 20 wt%.

26. The method of claim 25, wherein the amount of the mixture of alkoxylated alcohol and ashless dispersant in the power transmission fluid ranges from about 0.01 wt% to about 10 wt%.

27. A method of making a power transmission fluid comprising:
combining an alkoxylated alcohol with a dispersant and forming a mixture;
heating the mixture; and
adding a base oil to the mixture.

28. A method of making a power transmission fluid comprising:
combining an alkoxylated alcohol with a dispersant and forming a mixture; and
adding the mixture to a base oil.

29. An automatic transmission lubricated with the composition of claim 1.

30. An automatic transmission lubricated with the composition of claim 7.

31. The automatic transmission of claim 29 wherein the transmission is a continuously variable transmission.

32. The automatic transmission of claim 30 wherein the transmission is a continuously variable transmission.

33. A method of increasing the duration of friction-modifying capabilities of a power transmission fluid, said method comprising adding to, and operating in, a power transmission a fluid as set forth in claim 1.

34. A method of lubricating a power transmission, comprising adding to, and operating in, a power transmission a fluid as set forth in claim 1.

35. A method of measuring friction performance of a power transmission fluid using an LFW-1 test apparatus, comprising the steps:

applying a first power transmission fluid between a block and ring of an LFW-1 test apparatus;

rotating the ring relative to the block from a velocity of about 0 m/s to about 0.5 m/s in about 40 seconds at a constant rate of acceleration and then rotating the ring relative to the block from a velocity of about 0.5 m/s to about 0 m/s at a constant rate of deceleration to provide a cycle; and

measuring friction between the block and ring during the cycle.

36. The method of claim 35, comprising measuring friction during the cycle to provide about 50 or more measurements.

37. The method of claim 35, comprising measuring friction during the cycle to provide about 100 or more measurements.

38. The method of claim 35, comprising measuring friction during the cycle to provide about 2800 or more measurements.

39. The method of claim 35, comprising repeating the cycle from about 1 to about 50 times.

40. The method of claim 35, wherein the first power transmission fluid is a new fluid.

41. The method of claim 35, wherein the first power transmission fluid is an aged fluid.

42. The method of claim 35, further comprising:

measuring friction of the first power transmission fluid, wherein the first power transmission fluid is a new fluid;

aging the first power transmission fluid to provide an aged first power transmission fluid; and

measuring friction of the aged first power transmission fluid.

43. The method of claim 42, further comprising:

determining friction durability by comparing the measured friction of the aged first power transmission fluid to the new first power transmission fluid.

44. The method of claim 35, comprising:

measuring the friction of a second power transmission fluid, wherein the second power transmission fluid is different from the first power transmission fluid.

45. The method of claim 44, further comprising:

comparing the friction measurements of the first power transmission fluid and the second power transmission fluid; and

selecting the power transmission fluid for a particular power transmitting application based on the measurements.

46. The method of claim 45, wherein the particular power transmitting application comprises one or more of an automatic transmission, a continuously variable transmission, and a torque converter.

47. The method of claim 44, further comprising:

measuring friction of the first power transmission fluid, wherein the first power transmission fluid is a new fluid;

aging the first power transmission fluid to provide an aged first power transmission fluid;

measuring friction of the aged first power transmission fluid;

determining friction durability of the first power transmission fluid by comparing the measured friction of the aged first power transmission fluid to the new first power transmission fluid;

measuring friction of the second power transmission fluid, wherein the second power transmission fluid is a new fluid;

aging the second power transmission fluid to provide an aged second power transmission fluid;

measuring friction of the aged second power transmission fluid; and

determining friction durability of the second power transmission fluid by comparing the measured friction of the aged second power transmission fluid to the new second power transmission fluid.

48. A method of selecting a power transmission fluid for a particular power transmitting application comprising the method of claim 47, further comprising:

selecting a power transmission fluid by comparing the friction durability of the first power transmission fluid and the second power transmission fluid.

49. The method of claim 48, wherein the first power transmission fluid comprises an alkoxylated alcohol and the second power transmission fluid is free of alkoxylated alcohol.

50. The method of claim 48, wherein the first power transmission fluid comprises a first alkoxylated alcohol and the second power transmission fluid comprises a second alkoxylated alcohol, the first alkoxylated alcohol being different from the second alkoxylated alcohol.

51. The method of claim 48, wherein the particular power transmitting application comprises one or more of an automatic transmission, a continuously variable transmission, and a torque converter.